FERC-0048

PLANNING STATUS REPORT

WATER RESOURCES APPRAISAL
FOR HYDROELECTRIC LICENSING

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MENOMINEE RIVER BASIN

MICHIGAN, WISCONSIN

FEDERAL ENERGY REGULATORY COMMISSION
OFFICE OF ELECTRIC POWER REGULATION
CHICAGO REGIONAL OFFICE

Revised August 1980

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PLANNING STATUS REPORT

WATER RESOURCES APPRAISAL FOR HYDROELECTRIC LICENSING

This is one of a series of revised Planning Status Reports for major river basins in the United States. The original reports, which were prepared several years ago, are being revised as part of a program of Water Resources Appraisals for Hydroelectric Licensing. The revised reports provide updated information on water resources for use by the Federal Energy Regulatory Commission and its staff when considering hydroelectric licensing and other work. The reports present data on water resource developments, existing and potential, and on water use by existing and projected steam-electric generating facilities. The reports also summarize past and current planning studies. The information presented in these reports was abstracted from available sources and involved no new analyses. Information is current as of June 1980 unless otherwise indicated. The report is a staff effort which was not prepared for adoption or approval by the Commission, and does not commit or prejudice later Commission action. Although others contributed to the preparation, the primary authors were Seth Sawar and John Gage in the Chicago Regional Office.

FEDERAL ENERGY REGULATORY COMMISSION
OFFICE OF ELECTRIC POWER REGULATION
CHICAGO REGIONAL OFFICE

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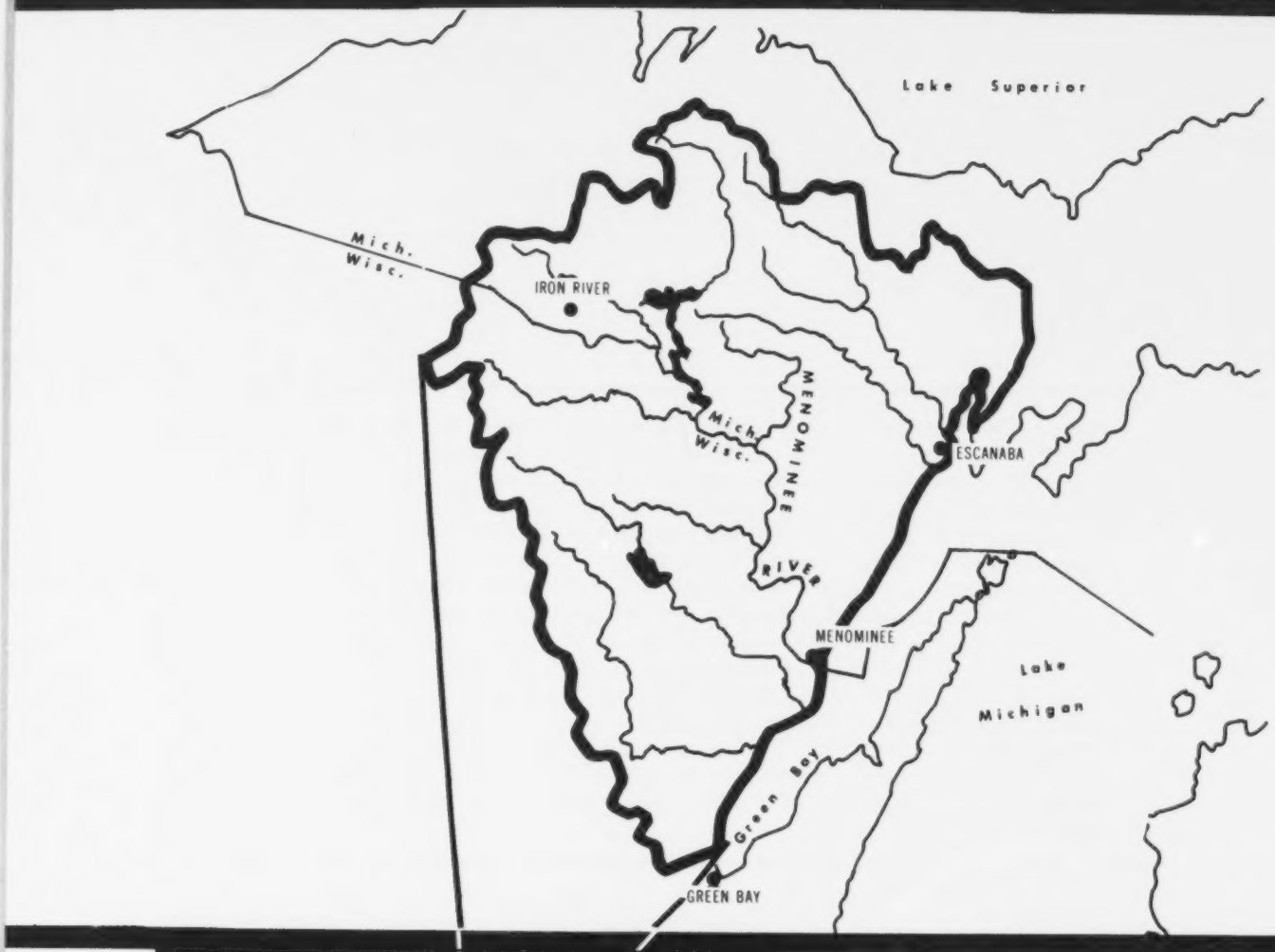
THE MENOMINEE RIVER BASIN AREA



DESCRIPTION OF THE BASIN

Menominee River

Menominee River is the largest of four major rivers described in this report. The Menominee, Peshtigo, Oconto, and Escanaba Rivers along with the smaller rivers, Cedar, Ford, and White Fish, all discharge into the Green Bay portion of Lake Michigan. The Menominee River is formed by the junction of the Brule and Michigamme Rivers and flows in a generally southeasterly direction into Green Bay, an arm of Lake Michigan. The Menominee River and part of the Brule River form a portion of the boundary between the State of Wisconsin and the Upper Peninsula of the State of Michigan. The Menominee River is 118 miles long and has a drainage area of 4,070 square miles. The Sturgeon, Pike, Paint, and Pine Rivers are the principal tributaries, in addition to those previously mentioned. The headwaters of the various tributaries are at elevation from 1,000 to 1,800 feet above sea level, and the mouth of the river is at about elevation 580 feet. A stream profile, figure 1, and a detailed basin map, figure 2, are included at the end of this report.

The average annual rainfall in the basin is about 30 inches, and the average run-off is approximately 12 inches. The river is not subject to destructive floods, and irrigation in the basin is unnecessary. The basin contains little cultivated land and only a small amount of marketable timber. Principal industries are the mining of iron ore and the manufacture of paper.

The Menominee River and its tributaries are important water power streams having 20 developments with a total installed capacity of 107,177 kilowatts as shown in table 1. A considerable degree of natural flow regulation is provided by the large number of swamps and small lakes in the upper part of the watershed.

Peshtigo River

Peshtigo River lies wholly in the State of Wisconsin with headwaters in the northern part of the State and flows in a southeasterly direction into Green Bay. The drainage basin comprises about 1,100 square miles, is 80 miles long, and averages about 14 miles in width. The total fall in the river's length of 140 miles is about 1,040 feet of which about 280 feet have been developed for the generation of power. There are six powerplants on the river with a total installed capacity of 22,724 kilowatts. There is no general flood problem on the river and irrigation is not necessary.

Oconto River

Oconto River rises in northeastern Wisconsin and flows southeasterly into Green Bay. It has a length of about 110 miles and a drainage area of about 990 square miles. The Oconto River basin consists largely of second growth timberland with small areas of improved farms. There are three hydroelectric powerplants on the river with a total installed capacity of 4,180 kilowatts. Flood damage on this stream is nominal, and irrigation is not necessary. The average annual rainfall is about 31 inches.

Escanaba River

Escanaba River's source is in the western part of Marquette County in the Upper Peninsula of Michigan in rough, almost mountainous, country at about elevation 1,600 feet above sea level. The river falls about 1,000 feet as

DESCRIPTION OF THE BASIN

Table 1

Existing Hydroelectric Projects
Menominee River Basin Area

Map No.	Project Name	River	State	Owner Class 1/	Owner	FERC Project No.	Usable Storage Capacity (ac-ft)	Gross Head (ft)	Installed Capacity (kW)	Average Annual Generation (MWH)	Initial Operation Year
Oconto River Basin											
1	Stiles	Oconto	Wisconsin	U	Oconto Electric Cooperative	1981	2,300	20	1,000	5,000	1949
2	Oconto Falls	Oconto	Wisconsin	I	Scott Paper Company	2689	50	37	1,860	7,700	1941
3	Oconto Falls	Oconto	Wisconsin	U	Wisconsin Electric Power Co.	2523	240	28	1,320	5,900	1915
									4,180		
Peshtigo River Basin											
4	Peshtigo	Peshtigo	Wisconsin	U	Wisconsin Public Service Corp.	2581	1,000	13	584	3,200	1920
5	Potato Rapids	Peshtigo	Wisconsin	U	Wisconsin Public Service Corp.	2560	322	18	1,380	4,800	1921
6	Sandstone Rapids	Peshtigo	Wisconsin	U	Wisconsin Public Service Corp.	2546	298	43	3,840	15,000	1925
7	Johnson Falls	Peshtigo	Wisconsin	U	Wisconsin Public Service Corp.	2522	252	43	3,520	12,000	1923
8	High Falls	Peshtigo	Wisconsin	U	Wisconsin Public Service Corp.	2595	3,400	85	7,000	15,000	1910
9	Caldron Falls	Peshtigo	Wisconsin	U	Wisconsin Public Service Corp.	2525	2,100	80	6,400	17,000	1924
									22,724		
Menominee River Basin											
10	Menominee	Menominee	Michigan	I	Scott Paper Co	2744	0	12	916	6,900	1925
11	Park Mill	Menominee	Wisconsin	I	Scott Paper Co.	2744	0	16	1,744	13,400	1920
12	Grand Rapids	Menominee	Michigan	U	Wisconsin Public Service Corp.	2433	0	28	7,020	36,500	1910
13	White Rapids	Menominee	Michigan	U	Wisconsin Electric Power Co.	2357	1,200	29	8,000	40,400	1927
14	Chalk Hill	Menominee	Michigan	U	Wisconsin Electric Power Co.	2394	2,000	28	7,800	36,700	1927
15	Sturgeon Falls	Menominee	Michigan	P	City of Norway, Michigan	2720	4,800	25	3,500	22,000	1905
16	Sturgeon River	Sturgeon	Michigan	U	Wisconsin Electric Power Co.	2471	700	66	800	4,000	1923
17	Little Quinnesec Falls	Menominee	Wisconsin	U	Niagara Wisconsin Paper Corp.	2536	600	67	8,388	35,000	1916
18	Quinnesec Falls 2/	Menominee	Michigan	U	Wisconsin Electric Power Co.	1980	0	61	3,530	4,000	1914
19	Big Quinnesec Falls	Menominee	Michigan	U	Wisconsin Electric Power Co.	1980	1,000	91	16,000	104,875	1949
20	Kingsford	Menominee	Michigan	U	Wisconsin Electric Power Co.	2131	1,700	30	7,200	31,200	1924
21	Pine	Pine	Wisconsin	U	Wisconsin Electric Power Co.	2486	340	94	3,600	19,000	1922
22	Twin Falls	Menominee	Michigan	U	Wisconsin Electric Power Co.	1759	4,000	44	6,144	32,700	1912
23	Michigamme Falls	Michigamme	Michigan	U	Wisconsin Electric Power Co.	2073	1,500	60	9,600	42,000	1953
24	Peavy Falls	Michigamme	Michigan	U	Wisconsin Electric Power Co.	1759	34,000	94	12,000	63,860	1963
25	Hemlock Falls	Michigamme	Michigan	U	Wisconsin Electric Power Co.	2074	400	34	2,800	13,800	1953
26	Way	Michigamme	Michigan	U	Wisconsin Electric Power Co.	1759	120,000	38	1,800	10,100	1969
27	Brule Island	Brule	Michigan	U	Wisconsin Electric Power Co.	2431	3,480	63	5,335	15,100	1919
28	Lower Paint	Paint	Michigan	U	Wisconsin Electric Power Co.	2072	0	24	100	750	1952
29	Paint River	Paint	Michigan	P	Crystal Falls Light & water Dept.	-----	0	21	900	3,000	1914
									107,277		
Escanaba River Basin											
30	Escanaba No. 1	Escanaba	Michigan	I	Mead Corporation	2506	800	24	1,950	6,700	1907
31	Escanaba No. 3	Escanaba	Michigan	I	Mead Corporation	2506	0	31	2,500	9,900	1919
32	Escanaba No. 4	Escanaba	Michigan	I	Mead Corporation	2506	0	49	4,740	14,000	1921
33	Escanaba	Escanaba	Michigan	I	Cliffs Electric Service Co.	2383	2,500	53	2,000 3/	5,000	1929
									11,190		

1/ U-privately-owned utility; I-industrial; P-non-Federal publicly-owned utility.
2/ Near Big Quinnesec Falls Dam.
3/ Capability of plant is 1,800 kilowatts.

it flows southeasterly across Marquette and Delta Counties to its mouth on the Lake Michigan shoreline at Little Bay de Noc, several miles north of Escanaba and north of Escanaba Harbor. The area of the watershed tributary to this system is about 890 square miles. The basin is about 70 miles long, wedge-shaped with the greatest width about 25 miles. There are four hydroelectric powerplants on the river with a total installed capacity of 11,190 kilowatts.

EXISTING WATER RESOURCE DEVELOPMENTS

Table 1 lists 33 existing hydroelectric projects, with a total installed capacity of 145,271 kilowatts, in the area covered by this report. Included in the total are 2 plants that belong to non-Federal, publicly-owned utilities with a total installed capacity of 4,400 kilowatts, 7 industrial plants with a total installed capacity of 15,710 kilowatts, and 24 privately-owned utility plants with a total installed capacity of 125,161 kilowatts. The locations of these projects are shown on figures 1 and 2.

There are also two retired hydroelectric projects. Information on these projects is provided in table 2.

EXISTING WATER RESOURCE DEVELOPMENTS

Table 2

Retired Hydroelectric Plants
Menominee River Basin Area

Map No.	Project	River	State	Owner Class 1/	Owner	Installed Capacity (kW)	Year of Retirement
39	Republic	Michigamme	Michigan	I	Cliffs Electric Service Company	640	1963
40	Escanaba No. 2	Escanaba	Michigan	I	Escanaba Paper Company	1,100	1968

1/ *I-industrial.*

There are several U.S. Army Corps of Engineers' navigation projects in the Menominee River basin. The Little Bay de Noc, Gladstone Harbor and Kipling, Lake Michigan project was completed in 1965. This project provided for a channel from deep water, enlarging at the landward end to form a turning basin. The Menominee Harbor and River Lake Michigan project involved the deepening of the river mouth and channel and enlarging the turning basin. The turning basin is now classified as an inactive project. The Oconto Harbor, Wisconsin project was completed in 1967. Improvements and renovations included deepening the river channel from the harbor to a point above the river mouth and enlarging the turning basin.

Data on the existing five fossil-fueled steam-electric generating stations in the Menominee River basin area are shown in table 3. These powerplants have a combined installed capacity of 103,300 kilowatts. Each of the five plants employ once-through cooling. The figures given in table 3 regarding cooling water needs are average values. The actual daily withdrawal rates are dependent upon daily generation and the temperature of the cooling waters. Usually, lesser amounts of water are required during the winter months per kilowatt-hour produced. Conversely, summer temperatures result in expanded cooling water needs.

Table 3

Existing Steam-Electric Powerplants
Menominee River Basin Area

Map No.	Project Name	State	Owner Class 2/	Owner	Installed Capacity (kW)	Average Annual Energy (MWH)	Initial Operation Year	Type Cooling 1/	Condenser Flow	Withdrawal (mgd)	Consumption (mgd)	Return	Source of Cooling Water
41	Escanaba	MI	U	Upper Peninsula Power Company	21,000	148,356	1957	OT	35.4	35.4	3.2	32.2	Lake Michigan
42	Gladstone	MI	U	City of Gladstone	6,000	16,820	1955	OT	3.2	3.2	0.0	3.2	Little Bay de Noc
43	Niagara	WI	I	Niagara of Wisconsin Paper Corporation	12,000	69,764	1940,1964	OT	12.0	12.0	0.1	11.9	Menominee River
44	Menominee	MI	I	Menominee Paper Co., Inc.	6,000	23,303	N.A. 3/	OT	3.6	3.6	0.0	3.6	Menominee River
45	Escanaba	MI	I	The Mead Corporation	56,300	352,519	1972	OT	16.0	16.0	0.0	16.0	Little Bay de Noc
				Totals	103,300	610,762							

1/ *Once-through.*
2/ *Supplemental-small utility, I-industrial.*
3/ *Information not available.*

STATUS OF HYDROELECTRIC LICENSING

Of the 33 non-Federal hydroelectric developments, licenses have been issued for 28, license applications are pending for 2, license applications have been dismissed for 2, and an application has not been filed for 1. The Federal Energy Regulatory Commission's license status of the 33 existing non-Federal hydroelectric power developments is shown in table 4.

Table 4

License Status of Existing Hydroelectric Developments
Menominee River Basin Area

Project Name	Owner	FERC Project No.	License Expiration Date
	Licensed Developments		
Twin Falls	Wisconsin Electric Power Co.	1759	Dec. 31, 2001
Peavy Falls	Wisconsin Electric Power Co.	1759	Dec. 31, 2001
Way	Wisconsin Electric Power Co.	1759	Dec. 31, 2001
Big Quinnesec Falls	Wisconsin Electric Power Co.	1980	Feb. 28, 1998
Quinnesec Falls	Wisconsin Electric Power Co.	1980	Feb. 28, 1998
Stiles	Oconto Electric Coop.	1981	Feb. 29, 2000
Lower Paint	Wisconsin Electric Power Co.	2072	Dec. 31, 2001
Michigamme Falls	Wisconsin Electric Power Co.	2073	Oct. 31, 2001
Hemlock Falls	Wisconsin Electric Power Co.	2074	Oct. 31, 2001
Kingsford	Wisconsin Electric Power Co.	2131	June 30, 2004
White Rapids	Wisconsin Electric Power Co.	2357	Dec. 31, 1993
Chalk Hill	Wisconsin Electric Power Co.	2394	June 30, 1993
Brule Island	Wisconsin Electric Power Co.	2431	Dec. 31, 1993
Grand Rapids	Wisconsin Public Service Corp.	2433	Dec. 31, 1993
Sturgeon River	Wisconsin Electric Power Co.	2471	Dec. 31, 1993
Pine	Wisconsin Electric Power Co.	2486	Dec. 31, 1993
Escanaba No. 1	Escanaba Paper Co.	2506	Dec. 31, 1993
Escanaba No. 3	Escanaba Paper Co.	2506	Dec. 31, 1993
Escanaba No. 4	Escanaba Paper Co.	2506	Dec. 31, 1993
Peshtigo	Wisconsin Public Service Corp.	2581	Dec. 31, 1993
Potato Rapids	Wisconsin Public Service Corp.	2560	Dec. 31, 1993
Sandstone Rapids	Wisconsin Public Service Corp.	2546	Dec. 31, 1993
Johnson Falls	Wisconsin Public Service Corp.	2522	Dec. 31, 1993
High Falls	Wisconsin Public Service Corp.	2595	Dec. 31, 1993
Caldron Falls	Wisconsin Public Service Corp.	2525	Dec. 31, 1993
Oconto Falls	Wisconsin Electric Power Co.	2523	Dec. 31, 1993
Little Quinnesec Falls	Niagara of Wisconsin Paper Co.	2536	June 30, 1993
Oconto Falls	Scott Paper Co.	2689	Dec. 31, 1993
	Unlicensed Developments		
Menominee	Scott Paper Co.	2744 (application dismissed)	
Park Mill	Scott Paper Co.	2744 (application dismissed)	
Sturgeon Falls	City of Norway, Michigan	2720 (license application pending)	
Escanaba	Cliffs Electric Service Co.	2383 (license application pending)	
Paint River	Crystal Falls Light and Water Dept.	---- (application not filed)	

Prior Studies and Reports

Much of the data utilized in this report was obtained from available reports of various Federal, State, and local agencies. The reports having a direct and important bearing on matters pertaining to possible hydroelectric aspects of water and related land resources of the Menominee River basin are briefly described below.

A report on the Menominee River basin was made under provisions of House Document No. 308 and published as House Document No. 141, 72nd Congress, 1st Session, 1931. In the report, the Board of Engineers for Rivers and Harbors concluded that further improvement of the Menominee River for navigation, in connection with power development, flood control, and irrigation, was not justified.

The Menominee County Soil Conservation District and the Little River Drainage District with the assistance of the U.S. Soil Conservation Service and the U.S. Forest Service prepared a report, dated April 1962, titled, "Watershed Work Plan - Little River Watershed." The report outlines recommended measures for watershed protection and flood control.

In 1965, the Federal Power Commission released a Planning Status Report on the Menominee River basin. This report was one of a series covering the 50 States for the purpose of identifying those most in need of additional planning studies and to provide information for licensing of non-Federal hydroelectric projects.

The Dickinson Soil Conservation District and the Dickinson County Road Commission, Dickinson County, Michigan, and the East Branch of the Sturgeon River Water Users Association, with the assistance of the U.S. Soil Conservation Service and the U.S. Forest Service, prepared a report titled "Work Plan - East Branch Sturgeon River Watershed." The report, dated February 1966, outlines recommended measures for water management problems in the area.

A report "Outdoor Recreation - Potential Related to Hydroelectric Development in the Michigan Portion of the Menominee River Basin," dated August 1966, was prepared by the Recreation Resource Planning Division of the Michigan Department of Conservation (now Department of Natural Resources) in consultation with the Wisconsin Department of Conservation (now Department of Natural Resources), and the Wisconsin Electric Power Company. The report contains information on outdoor recreation and future needs.

In December 1966, the Wisconsin Conservation Department published a report titled "Recreation Inventory of Wisconsin Michigan Power Company Lands in Wisconsin." The basin's recreational needs and opportunities were identified in the report.

The Wisconsin Conservation Department published a report, dated 1966, titled "A Comprehensive Plan for Wisconsin, Outdoor Recreation." This report presents basic guidelines for the development of outdoor recreation needs.

The Water Resources Commission of the State of Michigan published a report titled "Water Resources Uses - Present and Prospective for the Menominee and Montreal River Basins." The report, dated June 1967, was published pursuant to the Federal Water Quality Control Act of 1965. The report outlines prospective water

quality criteria for the Menominee River together with a plan for implementing and enforcing the criteria proposed therein.

In 1970, the Federal Power Commission released an Appraisal Report titled "Water Resources Appraisal for Hydroelectric Licensing - Menominee River Basin, Michigan and Wisconsin." This report was prepared primarily for the use of the Commission and its staff when considering matters related to hydroelectric licensing, relicensing, or recommendation for Federal takeover.

The Great Lakes Basin Commission was established pursuant to provisions of the Water Resources Planning Act to coordinate the water and related land resources planning in the Great Lakes basin. Membership on the Commission includes representatives of affected States and Federal agencies and appropriate interstate agencies. The Commission has prepared a comprehensive study of the basin. The initial report was released in December 1974. The Menominee River basin is part of the Great Lakes basin.

A report by Marinette County titled "Outdoor Recreation Plan" was released in 1970. This plan outlines the county's objectives and policies towards recreational activity by considering its present and potential areas and discussing the present and future needs of the county's population.

Other recreation plans offered by Wisconsin communities in the Menominee River basin include the "City of Marinette Comprehensive Plan" which was released in 1971; the "Niagara Recreation Plan," City of Niagara, also released in 1971; and "Florence County Recreation Plan," 1971, published by Northeastern Wisconsin Regional Planning Commission.

The Michigan Department of Natural Resources, Water Resources Commission, released, in November 1973, water quality standards applicable to the Great Lakes, their connecting waterways, and all other surface waters of the State. The standards are promulgated to protect the quality of waters for recreational purposes, public and industrial water supplies, agricultural uses, navigation, and propagation of fish and other aquatic life and wildlife.

The Menominee River watershed was the subject of a 2-year study titled "Phosphorus Loading from a Multiland Use Watershed." The report, released by Marquette University, found that during periods of high precipitation as much as 83 pounds of phosphate per day per square mile drains into the Menominee River. It was estimated that 1,250 pounds of phosphate per day enters Lake Michigan.

A report titled "The Pollution Environment" was published in 1966 by the Federal Water Pollution Control Administration. This report details the effects of pulp and paper wastes upon the aquatic life in the Menominee River.

In 1969, the Wisconsin Department of Natural Resources, Division of Environmental Protection released "Report on an Investigation of the Pollution of the Menominee River and Its Tributaries in Wisconsin Made During 1968." This report concluded that the paper industry is the largest source of pollutant loading to the Menominee River. However, the report also noted that stream conditions have been improving downstream of the industries because of improved treatment or deleted processes. The report also stated that additional improvements would be possible with a continued upgrading of industrial and municipal sewage treatment facilities.

WATER RESOURCES PLANNING

The Second National Water Assessment is the second Nationwide Evaluation of the Water Resources Council as required by Public Law 89-80 to maintain a continuing study of the adequacy of the Nation's water and related land resources to meet present and future requirements for these resources. The first such assessment was reported on by the Council in 1968. The second assessment, reported on in 1978, found that significant achievements have been made in the past decade since the first assessment in preserving water and harnessing its power with a growing interest in water conservation and environmental protection. However, greater efforts are needed to insure the protection of our water resources and to solve the complex water and related land problems which still exist.

Ongoing Studies

The Great Lakes Basin Framework Study was begun in 1967 under the aegis of the Great Lakes Basin Commission to develop an information base and to prepare components for a future Comprehensive Coordinated Joint Plan (CCJP) for the conservation, use, and development of water and land resources in the Great Lakes area through the year 2020. The Commission membership is comprised of representatives of State and Federal agencies involved with planning of water resources development within the basin. The Framework Study with its associated Level A, B, and C studies is the basis for the CCJP which is to be prepared for the U.S. Water Resources Council as required by Public Law 89-80.

The Framework Study which is the first and broadest level, Level A, evaluated and appraised, on a broad basis, the needs and desires of the people for the conservation, development, and utilization of water and related land resources and identified regions (hydrologic, political, economic, etc.) with complex problems which require more detailed investigations and analyses. This study, published in 1976, did not involve basic data collection, cost estimating, or detailed plan formulation. The Level B studies, which are now being done, are preliminary and reconnaissance water and related land plans for a selected area or river basin. The final level, Level C, will be done in the future and consists primarily of specific project or program feasibility studies in the river basins or regions.

The Comprehensive Coordinated Joint Plan (CCJP) prepared by the Great Lakes Basin Commission is related to the Framework Study in that it is the current recommended regional plan resulting from the same continuous planning process involving Federal, State, interstate, and local agencies concerned with the conservation, development, and utilization of water and related land resources. The CCJP (Regional Plan) was required by the Water Resources Planning Act (P.L. 89-80) and is a basic component of the National Planning Strategy being developed by the U.S. Water Resources Council. The other two basic components of this strategy are Nationwide Evaluation and Statewide Plans.

POTENTIAL WATER RESOURCE DEVELOPMENTS

Authorized Plans

There are, at this time, no projects in the basins which have been authorized by Congress for Federal construction.

POTENTIAL WATER RESOURCE DEVELOPMENTS

There are five potential hydroelectric development sites in the basins covered by this report and three potential additions to existing hydroelectric powerplants. The total known potential for hydroelectric power in the basin is approximately 55,500 kilowatts with a potential average annual energy production of about 238,000,000 kilowatt-hours. These potential developments are shown in table 5 and on figures 1 and 2.

Map No.	Proposed Project Name	River	State	Gross Head (ft)	Installed Capacity (kW)	Average Annual Energy (Mwh)
1	Stiles 1/	Oconto	WI	20	500	2,000
15	Sturgeon Falls 1/	Menominee	MI	25	1,500	9,000
19	Big Quinnesec Falls 1/	Menominee	MI	91	8,000	32,000
34	Roaring Rapids	Peshtigo	WI	200	9,700	49,400
35	Chappie Rapids	Menominee	MI/WI	16	5,200	24,000
36	Pemene Falls	Menominee	MI/WI	32	10,000	40,000
37	Pemene Dam	Menominee	MI/WI	28	7,000	33,000
38	Sand Portage	Menominee	MI/WI	43	13,600	49,000
			Totals		55,500	238,400

The occurrence of falls and rapids in the river at these sites creates much of the power head available for development. Chappie Rapids is located furthest downstream and would develop the greater part of the fall of the river between the existing Marinette and Grand Rapids projects. Pemene Falls and Pemene Dam would produce power in the undeveloped reach between the existing Sturgeon Falls and Little Quinnesec Falls developments. The sites are shown on figures 1 and 2.

Economic analysis of each project undertaken in 1968 indicated that the annual cost would outweigh the annual value of power produced. Future studies may identify economical hydroelectric power potential at small existing dams.

There are no rivers in the Menominee River basin area included in the Federal Wild and Scenic Rivers Act, Public Law 90-542. Therefore, the potential hydroelectric sites will not be affected by this program. However, the State of Michigan has designated wild, scenic, and recreational rivers through its Natural River Act of 1970, Act No. 231. As a result, the State has under study the Fence and Whitefish Rivers, and also has proposed for study the Paint, Escanaba, and Sturgeon Rivers to be included in its natural river system. Under the system, there are three classifications of natural rivers:

POTENTIAL WATER RESOURCE DEVELOPMENTS

1) Wilderness River - a free flowing river with essentially primitive, undeveloped adjacent land.

2) Wild-Scenic - a river with wild, forested borders; near development; and moderately accessible.

3) Country-Scenic - a river in an agricultural setting with pastoral borders, some homes, and readily accessible.

Based on available information, it is not known into what class, if any, the rivers proposed for study would be placed.

Michigan has no Federal or State designated Wilderness Areas within the Menominee River basin area. The State of Wisconsin, under its Statute 30.26 titled "Wild Rivers," has designated the Pike River in Marinette County, and the Pine River and its tributary, Popple River, in Florence and Forest Counties, as wild rivers. These rivers are located within the Menominee River basin. Wisconsin's guidelines for wild river establishment are as follows:

1) "Both the quality of the water and the use of the adjacent lands are nearly in their original condition or are restorable thereto at costs deemed warranted by the Board."

2) "The shoreline is substantially devoid of man-made developments, improvements, or other activities, or is restorable thereto at costs deemed warranted by the Board."

Aside from those wilderness easement areas adjacent to the designated wild rivers, the Wisconsin Department of Natural Resources has specified no wilderness areas in the Menominee or Oconto River basin.

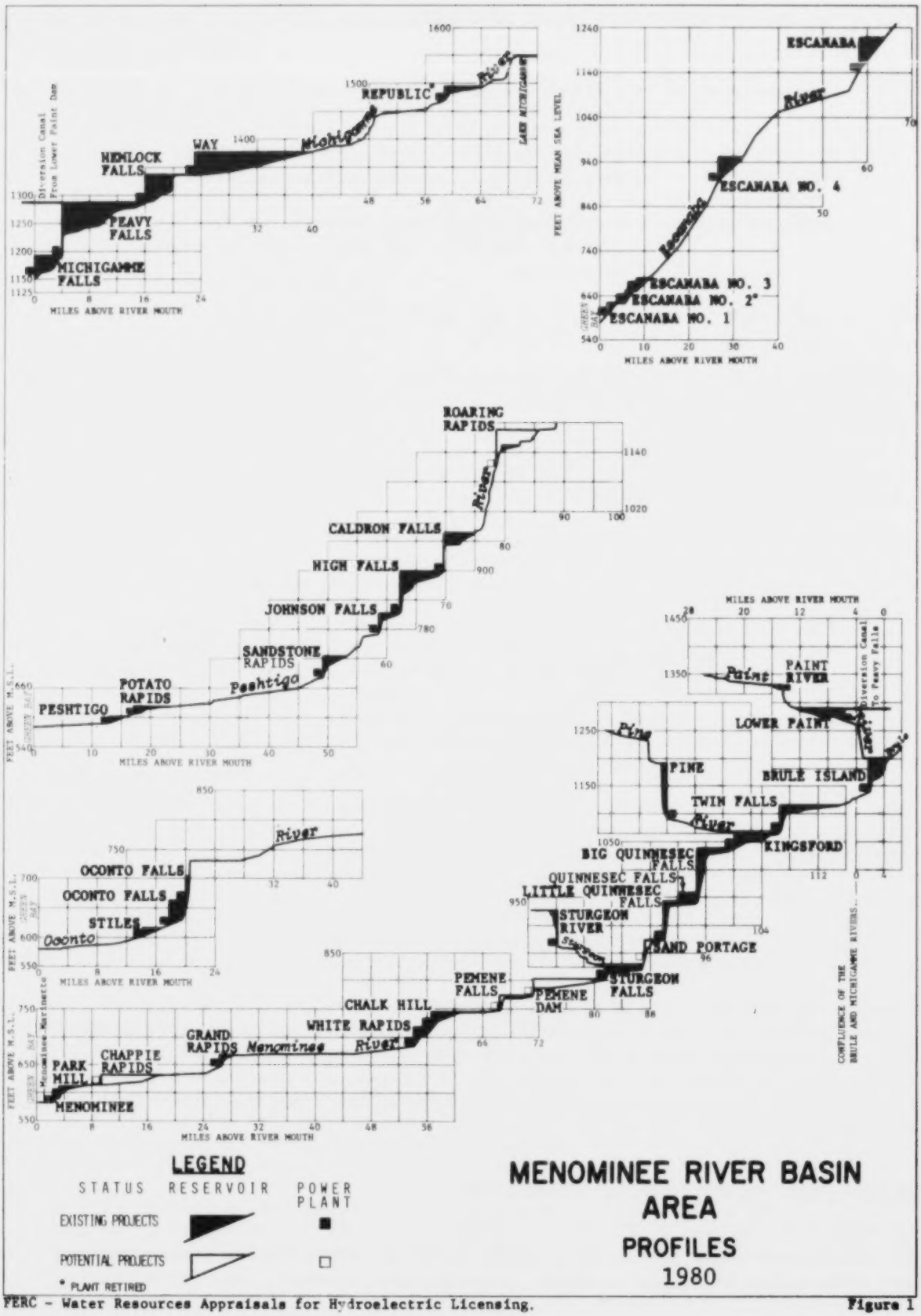
There are no pumped storage projects in the Menominee River basin area nor are there any potential, economically feasible sites. Probable sites within the river basin are neither technologically nor economically feasible. Also, there are no sites within the river basin area requiring further investigation regarding feasibility.

There are no known steam-electric generating plants proposed for future construction in the basin area.

Future energy production and cooling water needs for steam-electric plants with installed capacities of 25 megawatts or greater are available from the Water Resources Council's "Second National Water Assessment." Future cooling water requirements of steam-electric plants are not provided since there are no known steam-electric generating stations proposed for construction in the Menominee River basin area.

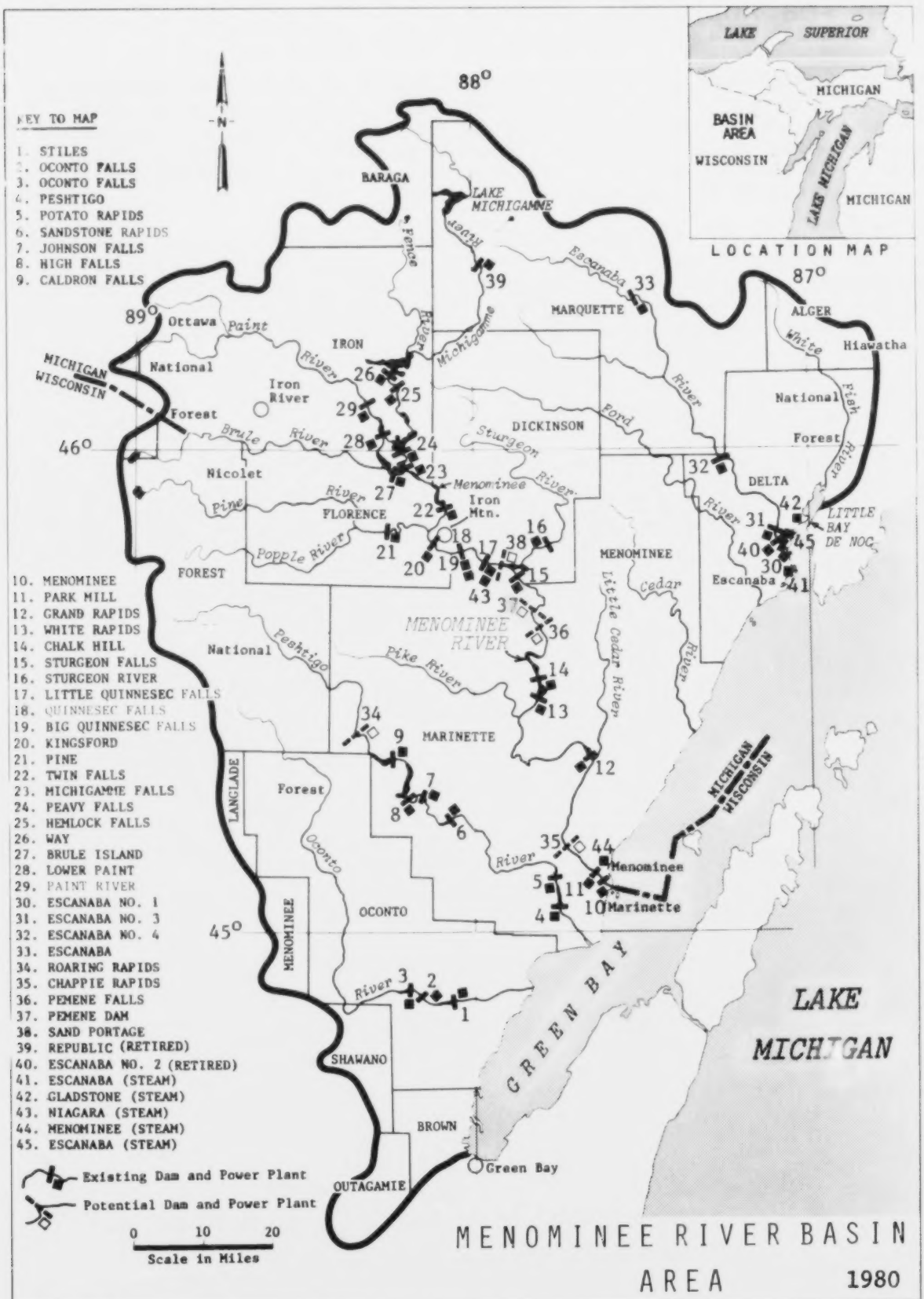
NEED FOR ADDITIONAL STUDIES

The undeveloped power potential at three existing hydroelectric powerplants and five other sites is due to economic infeasibility; however, this infeasibility



FERC - Water Resources Appraisals for Hydroelectric Licensing.

Figure 1



FERC - Water Resources Appraisals for Hydroelectric Licensing.

Figure 2

was based on prevailing variables that were present in 1968. It is suggested that a new study of this potential be undertaken. Utilizing up-to-date fixed charges on capital costs and operation and maintenance expenses of hydroelectric plants compared to the costs of obtaining the equivalent power from an alternative source (such as fossil fuel or nuclear steam-electric generating stations) may renew interest in developing these sites.

Planning studies are also needed for evaluation of potential resource developments and conservation of land and water resources which would improve the economy and the general quality of the environment in the basin area. The potential projects include land- and water-based recreation, water supply, soil conservation, and other purposes, with special consideration to stream pollution problems that exist in some parts of the basin.

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